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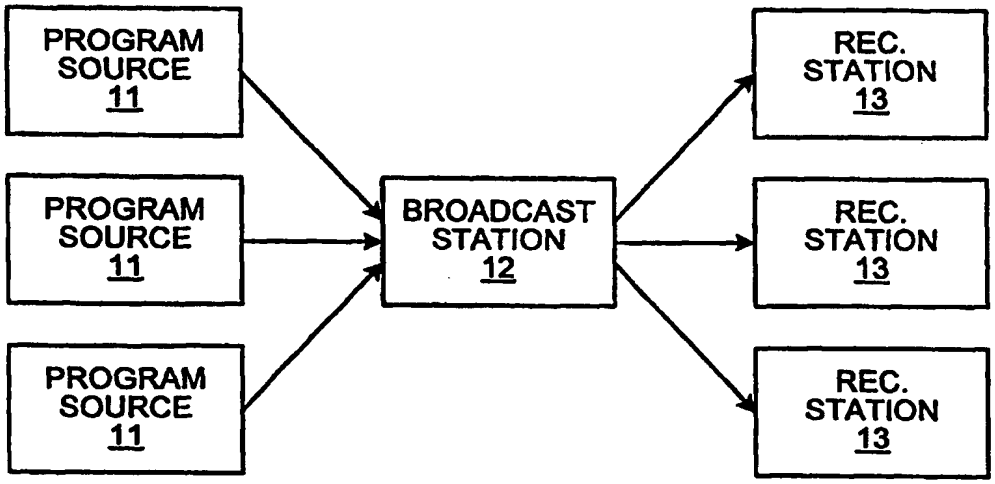

(57) Abstract

An interactive digital television system configured to accumulate information on viewing patterns by tracking viewer transactions and building viewer preferences for customizing program content. Information tracked by individual receiving stations (13) is stored in a set–top box and periodically transmitted to a broadcast station (12). Information tracked by the broadcast station (12) is accumulated and combined with information received from the receiving stations (13). The information is used to build viewer preferences, which in turn are used to filter the content of a program signal before and/or after the signal is transmitted from the broadcast station to the receiving stations in order to direct to particular viewers the programs in which they are most likely interested.

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Title: METHOD AND APPARATUS FOR PROFILING USER PREFERENCES BY A NETWORK OPERATOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to television systems and more particularly to methods and means for assembling information regarding viewer profiles and using these viewer profiles to generate viewer preference profiles.

2. Description of the Related Art

The emerging technology of interactive television systems holds a promise of allowing a television set to provide various new means for marketing products and services to viewers. Interactive television systems are capable of displaying text and graphic images in addition to typical video program streams and registering viewer responses. Proposed features of interactive television accommodate a variety of marketing, entertainment and educational capabilities such as allowing a user to interact with televised programs by ordering advertised products or services, competing against contestants in a game show, or requesting specialized information regarding a particular program.

Typically, the interactive functionality is controlled by a set-top box connected to the television set. The set-top box receives televised programs and interactive applications through typical broadcast channels, such as cable television (CATV) or direct satellite broadcasts. The interactive application may be designed to function in response to signals in the broadcast or actions taken by the viewer. The interactive functionality is displayed upon the television set screen and may include icons or menus to allow a user to make selections via the television's remote control.

It is desirable in the marketing of products or services to present advertisements to the viewers who are most likely to purchase the advertised goods or services. Manufacturers and providers of services attempt to tailor their marketing strategies to maximize the number of viewers who would be interested in their particular products and services. The strategies may also attempt to minimize the number of viewers who would not be interested in the offered products and services and for whom expenditures on marketing would essentially be wasted. These marketing strategies are often based on detailed information, or demographics, of the potential buyers and it is therefore beneficial to have as much information as possible on the preferences of the buyers.

It is desirable in the marketing of products and services to obtain accurate information on customers' television viewing habits and preferences. Various services use internet broadcast capabilities to distribute information and advertisements to users based on individual preferences. These services, however, typically require each user to provide specific information to define his or her preferences. The user thus controls the filtering of information and advertisements which are delivered to him or her. The user may thereby frustrate marketing strategies directed to that user. Also, because some users may feel that the effort of providing the preference information required to filter the received information is too great, they may not use the service at all, thereby defeating all marketing through the service.

It would therefore be desirable to employ a means to obtain information on the viewing habits and preferences of users without requiring the user to input all of the information and without having the viewer

control the filtering of the available material. By placing the relevant information in the hands of a broadcast service provider. the broadcast of materials over the network may be regulated in a manner which furthers. rather than hinders the marketing strategies which employ the network.

SUMMARY OF THE INVENTION

The problems outlined above are in large part solved by a system and method for building viewer population profiles and viewer preference filters in accordance with the present invention. In one embodiment, an interactive television system is configured to accumulate information on viewing patterns of its population of subscribers. The system collects this information by tracking transactions (e.g., viewing a program or responding to a prompt) and by requesting information from the viewer. On-line transactions are recorded by the broadcast service provider at the broadcast station. Local transactions are recorded by the set-top box of the receiving station and stored in the box's memory. The data which is accumulated by the set-top box is then periodically transmitted to the broadcast service provider and added to the information which is collected at the broadcast station.

The broadcast service provider uses the information tracked at the broadcast station and the information transmitted to the broadcast station from the individual set-top boxes to build a database of cumulative viewer data. The word "database" is used herein to refer to any body of data, not only to those bodies of data which are stored in a format corresponding to a particular database application. The broadcast station's cumulative database also includes information which the viewers themselves disclosed to the broadcast service provider. Based on the database, viewer population profiles are developed and viewer preference filters (individualized profiles) are generated by the broadcast service provider. The viewer preference filters are then transmitted to the set-top boxes, which use the filters to customize the information displayed to the users. The set-top box and broadcast station thus exchange data periodically in order to update the cumulative database at the broadcast station and the viewer preference filters at the set-top boxes.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the accompanying drawings in which:

Fig. 1 is a block diagram illustrating the distribution of programs from their sources to a series of viewers.

Fig. 2 is a diagrammatic representation of the signal transmitted from a broadcast station to a receiving station.

Fig. 3 is a block diagram illustrating one embodiment of a broadcast chain from a single remote station to a viewer's television.

Fig. 4 is a block diagram of a set-top box.

Fig. 5 is a flow diagram illustrating the collection and transmission of local data at the set-top box.

Fig. 6 is a flow diagram illustrating the customizing of program content at a receiving stati n.

Fig. 7 is a flow diagram illustrating the collection of data at the broadcast station and the building of user profiles and preferences.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof are shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that the drawings and detailed description thereto are not intended to limit the invention to the particular form disclosed, but on the contrary, the intention is to cover all modifications, equivalents and alternatives falling within the spirit and scope of the present invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Fig. 1, a block diagram illustrating the distribution of television programs from their sources to a series of viewers is shown. Each of remote stations 11 transmits a program signal to broadcast station 12. Broadcast station 12 then transmits one or more of the program signals to one or more of receiving stations 13. The television programs embodied in the program signals can comprise any of a number of program types, such as taped shows, live broadcasts, advertisements and the like.

Referring to Fig. 2, a diagrammatic representation of the signal transmitted from broadcast station 12 to receiving station 13 is shown. This figure shows the manner in which packets of compressed audio 42, 46, compressed video 41, 43, 45, 47 and compressed interactive application 44 are time multiplexed to form the transmitted signal. It can be seen from the figure that the signal includes audio and video packets of a first program 41, 42, 43 and audio and video packets of a second program 45, 46, 47. Each packet includes header information and data information to enable reconstruction of the packets into separate signals formatted for monitor 21. It can be seen from the figure that there are typically more packets of video data 41, 43, 45, 47 than audio data 42, 46 or interactive application data 44 as a result of the greater amount of video data which typically must be transmitted.

Referring now to Fig. 3, a block diagram illustrating one embodiment of a broadcast chain from a single remote station to a viewer's television is shown. A remote station 11 is shown transmitting a signal to broadcast station 12, which then transmits a signal to receiving station 13. Remote station 11 includes a program source 14 which generates a television program and a modulator 15 which converts the television program into a signal for transmission to broadcast station 12. Remote station 11 is not a necessary part of the system, but is shown as a reference to indicate a typical source of a broadcast program to the broadcast station. The figure depicts a free-space transmission via a communications satellite, but it is contemplated that any known means for supplying a program to the broadcast station may be used. Although television programs in particular are described above, the invention contemplates the broadcast of advertisements, applications and other program content to the viewer and is intended to include those types of program content within the scope of the invention. Accordingly, program source 14 may be of a type suitable for producing such program content.

Broadcast station 12 includes a demodulator 16 which converts the signal received from the remote station to a signal which can be manipulated by processing unit 17. Processing unit 17 may combine multiple program signals and multiplex the signals for transmission to the receiving station 13. In one embodiment, several broadcast programs are combined into a single signal through time-multiplexing, but this can be

accomplished by any of a number of methods, such as frequency-multiplexing or transmission over separate channels. The outgoing signal from broadcast station 12 is also typically compressed in order to conserve broadcast bandwidth. The combined signal is then converted by modulator 19 into a transmission signal and conveyed to receiving station 13. Broadcast station 12 is typically operated by a broadcast service provider such as a CATV service operator or a direct satellite service operator, although other broadcast service providers are contemplated. Again, the depiction of the transmission as a free-space transmission via communications satellite is intended to be exemplary rather than limiting.

Receiving station 13 includes set-top box 20 and television 21. Although the term "set-top box" is used herein, it is understood that this term refers to any processing unit for receiving and processing a transmitted signal and conveying the processed signal to a television or other monitor. The set-top box may be in a housing which physically sits on top of a television, it may be in some other location external to the television (e.g., on the side or back of the television or remotely located from the television), or it may be incorporated into the television itself. Set-top box 20 serves to demodulate the signal received from broadcast station 12 and to separate the components of the signal, such as different television programs, updated viewer preference filters and interactive applications. If the signal received from broadcast station 12 contains a viewer preference filter, the set-top box replaces the previously stored filter with the new filter.

It should be noted that "viewer preference filter" is used herein to describe data which is used, not simply to block certain content of a broadcast signal, but to provide a basis for customizing the content of the broadcast signal. The viewer preference filters can thus be considered individualized viewer preference profiles. The viewer preference filters can be used by applications which may block portions of the broadcast signal or portions of individual programs. For example, an application may block a commercial or a component of the commercial, such as a jingle. The viewer preference filters can also be used by applications which rearrange or add to the content of a broadcast signal. An example of such an application is one which changes the order in which channels are presented in an electronic programming guide. If the viewer is a sports fan, this application might present channels with basketball games before those having game shows. An application might also take some action apart from changing the content of the displayed programs. For instance, the application might selectively reject e-mail sent to the set-top box based on the viewer's profile (as contained in the viewer preference filter) and the likelihood that the viewer would not be interested in the e-mail.

Although viewer preference filter 23 is shown in Fig. 3 as a component of set-top box 20, the filter may be implemented in a number of ways, such as in a software application executing in the set-top box, and need not be a separate component of the set-top box. (It should also be noted that "transmitting filters" to the set-top box as used herein can mean both transmitting actual software filters and transmitting data which is used by hardware or software at the set-top box to implement filtering functions in a particular implementation.) The set-top box filters the remaining program content according using the viewer preference filter and displays or executes the filtered program signal components. The filtered broadcast program signal is then passed on to television 21. Television 21 may be a television or a video monitor employing any suitable television format (e.g., NTSC or HDTV), or it may be replaced by other devices, such as a video recorder.

Receiving station 13 may also include a return path (not shown) to the broadcast station. The return path allows the set-top box to transmit accumulated viewer data to the broadcast station for use in modifying the user

profiles and preferences. The return path may also be utilized by an interactive application to provide data or feedback to the broadcast service provider. The return path is commonly comprises a modem within the set-top box connected to a standard telephone line. The modem can establish communications through the telephone line to a modem within the broadcast station. Alternatively, the return path can utilize a portion of the bandwidth of a coaxial cable (e.g., in a CATV system.)

Referring to Fig. 4, a block diagram of a set-top box 20 is shown. The transmission signal from broadcast station 12 is received at receiving station 13, which typically comprises a standard television 21 equipped with a set-top box 20. The audio/video stream is typically compressed prior to transmission by broadcast station 12 using a compression algorithm such as one of the Motion Picture Expert Group (MPEG) compression standards. The transmission signal is fed to set-top box 20 and input to signal processing unit 30. Signal processing circuit 30 breaks down the transmission signal into component parts such as the audio and video portions of each program, and any interactive application which was included in the signal. Processing unit 30 includes viewer preference filter 23 which filters these components of the program signal. If, for example, the program signal contains a first television program, a second television program and an interactive application, filter 23 may cause only the first program to be selected for further processing and display. In another viewer's set-top box, filter 23 may be set to select both the first television program and the interactive application. (As described above, viewer preference filter 23 may be used to block, modify, augment or otherwise change the content of a broadcast signal and is not limited only to blocking programs as performed in this embodiment.)

In the embodiment illustrated in Fig. 4, the audio packets of the selected television program are reconstructed into a compressed audio portion of the program, which is then routed to audio decompression unit 31. Audio decompression unit 31 then decompresses the audio portion of the television program. The video packets are reconstructed into a compressed video portion of the television program, which is then routed to video decompression unit 32, where the video portion of the program is decompressed. The outputs of audio and video decompression units 31, 32 are connected to interactive audio unit 61 and interactive graphics unit 62, respectively. Interactive graphics unit 62 overlays the interactive graphics generated by the interactive application onto the broadcast video and routes the combined video to display unit 39. Interactive audio unit 61 combines the audio generated by the interactive application with the broadcast audio and directs the combined audio to display unit 39, which formats the audio and video signals and produces an output signal for a television.

If an interactive application is selected by filter 23, the application is stored in RAM 36 and executed. Control system 34 may transmit control signals generated by the application to interactive audio and graphics units 61, 62 in order to combine the audio and video of a broadcast television program with interactive audio and video for output to display unit 39 and television 21. It is contemplated that the various components of the set-top box may also be directly interconnected or consolidated into a single physical unit, or several units, as a matter of design choice. (It is noted that, for embodiments which augment or modify the content of the broadcast signal rather than blocking particular programs, the viewer preference filter may be more appropriately located in control system 34.) Similarly, the functions of the set-top box can be consolidated or divided among the components as a matter of design choice.

As mentioned above, in addition to separating the audio and video portions of the broadcast programs from the transmission signal, signal processing unit 30 separates the viewer preference filter from the signal. This

information is routed to random-access memory (RAM) 36. The viewer preference filter can be accessed by processing unit 30 in order to filter the content of the program signal. The filtering function can alternately be performed in control system 34, which is configured with a microprocessor (not shown) and is coupled to read-only memory (ROM) 35 and RAM 36 through system bus 33.

Control system 34 may include a microprocessor, micro-controller, digital signal processor (DSP), or some other type of software instruction processing device. RAM 36 may include memory units which are static (e.g., SRAM), dynamic (e.g., DRAM), volatile or non-volatile (e.g., FLASH), as required to support the functions of the set-top box. When power is applied to the set-top box, control system 34 executes operating system code which is stored in ROM 35. The operating system code executes continuously while the set-top box is powered in the same manner the operating system code of a typical personal computer (PC) and enables the set-top box to execute interactive and other applications and, if the set-top box is so designed, implement the viewer preference filters. The set-top box also includes modem 38, which provides a return path by which viewer data can be transmitted to the broadcast station.

Control system 34 may include a security device (not shown) or application which prevents unauthorized applications from being executed. The security device preferably includes means for verifying the credentials of programs received by the set-top box and means for preventing programs from accessing sensitive personal information of the viewer without first prompting the viewer for and receiving authorization for the access. Control system 34 also preferably includes remote control means (not shown) for facilitating user input to the system. The remote control could be of any type known in the art, including infrared, single-button or multifunction types.

In one embodiment, the user profiles are built by the broadcast service provider based upon the viewing data accumulated within the broadcast network. This data includes information on the various transactions which take place in the network, and may include transactions ranging from requests for pay-per-view events to interactive transactions to simple selections of programs. The specific data recorded in regard to the network transactions may vary from system to system. Transaction data is recorded both at the receiving station and at the broadcast station. Data which is available to the broadcast station at the time of the transaction ("on-line" data) is collected at the broadcast station. Data which is not available to the broadcast station at the time of the transaction ("local" data) is collected at the receiving station. Local data is preferably stored in the non-volatile RAM of the set-top box so that it is not lost if the set-top box is powered down. The local data is accumulated in the set-top box until a predetermined amount of data has been collected or a predetermined time period (e.g., one month) has expired. The local data is then transmitted to the broadcast station. In some embodiments, the transmission of the local data to the broadcast station can be externally triggered by signals which are broadcast or individually transmitted to the set-top boxes.

The receiving station is operatively connected to the broadcast station by a transmission medium. This transmission medium is contemplated to include media such as a coaxial cable and free space (e.g., as used for direct satellite transmissions.) The transmission medium forms a transmission path between the broadcast station and the receiving station. The broadcast station and receiving station are also connected by a return path. The return path typically c nsists of a pair of modems. one in the receiving station and one in the broadcast station, each connected to a standard telephone line. Other means for establishing a return path. e.g.. using a portion of

the bandwidth of the transmission path, are also contemplated. When the data storage of the set-top box is full, or when the predetermined time period expires, the receiving station initiates communications with the broadcast station and transmits the local data to the broadcast station. After the local data has been transmitted, the set-top box may terminate communication with the broadcast station and clear the local data storage before resuming normal collection of local data.

The broadcast station, which is connected to all of the subscribing receiving stations, accumulates data on the entire population of subscribers to the broadcast network. This data, including local data received from the receiving stations, forms the broadcast station's cumulative database. Based upon the information in the cumulative database, the broadcast service provider can determine viewing patterns, preferences and other information which form profiles corresponding to different types of viewers. These viewer population profiles may indicate that viewers of a particular program also tend to view a second program. Similarly, the profiles may indicate that viewers of a particular program may be interested in particular products and disinterested in others. For example, a viewer who watches an animated movie on a pay-per-view basis may be more interested in buying a videotape of cartoons than a videotape of an athletic event. Based upon the indications of the profiles, the broadcast service provider can make available to particular viewers the programs which they are most likely to watch or products and services which they are most likely to purchase. In this manner, the broadcast service provider can increase the effectiveness of marketing over the network by filtering or directing advertisements and programs to the viewers who are most likely to be impacted by them.

The filtering of the program content of the broadcast program signal is accomplished by generating a viewer preference filter for each of the receiving stations, transmitting the viewer preference filter to the receiving stations, and then filtering received program signals at the receiving stations. A viewer preference filter is generated for each receiving station according to the viewer population profiles and the relation of the viewer data for that particular receiving station to the profiles. The viewer preference filters are then transmitted to the respective receiving stations.

The filters may be transmitted via the broadcast channel used to broadcast the program signal to the receiving stations, or they may be transmitted via a modem connection (established by either the receiving station or the broadcast station.) If the filters are broadcast, each filter is accompanied by an identification code which allows the respective receiving station to identify it as the filter to be implemented in that particular receiving station. The request is broadcast to all the receiving stations and the receiving station which identifies the request as its own is prompted to establish a modem connection with the broadcast station in order to receive the filter. The filters can also be updated using conditional access addressing capabilities of the broadcast system. These capabilities allow messages, or filters, to be delivered to specific viewers or groups of viewers. Viewer preference filters can further be updated via modem connection. If the filter is transmitted via modem connection, the identification code need not accompany the filter, as it can only be received by a single receiving station. An identification code may, however, be used to accompany a request to a particular receiving station to establish a modem connection with the broadcast station in order to obtain the viewer preference filter.

Figs. 5-7 illustrate the operation of one embodiment of the disclosed system. Fig. 5 is a flow diagram illustrating the collection of local data at the set-t p b x and transmission of the data to the broadcast station. At step 101, the set-top box determines whether it is a predetermined time to upload the local data. At step 102, the

set-top box determines whether there is a local transaction which must be recorded. If there is no pending transaction and it is not time to upload the local data to the broadcast station, the set-top box spins in the l p between 101 and 102. This loop forms a wait state for the set-top box.

If it is determined that it is time to upload the local data to the broadcast station, the set-top box establishes communication with the broadcast station and transmits 105 the local data. The receiving station then returns to its wait state. If it is determined at 102 that there is a local transaction which must be recorded, the set-top box will update 103 the local data with the transaction information. After the local data is updated, the set-top box determines 104 whether the local data storage is full. If the storage is not full, the set-top box returns to its wait state. If the storage is full, the set-top box initiates 105 communications with the broadcast station, transmits the local data to the broadcast station and then returns to the wait state.

Fig. 6 is a flow diagram illustrating the filtering of program content at a receiving station in one embodiment. At step 111, the receiving station waits for a program to be received. When the receiving station receives a program, it applies the viewer preference filter to the program and determines 112 whether the program is passed or blocked by the filter. If the program is blocked by the filter, the receiving station resumes waiting 111. If the program is passed by the filter, the receiving station checks 113 the credentials of the program to determine whether execution of the program is authorized. If the program is not authorized, the program is not executed and the receiving station returns to its wait state 111. ("Execution" may include displaying or other processing of the program, depending on the program type.) If the program is authorized, the program is checked 114 to determine whether execution of the program requires access to sensitive personal information. If the program does not require access to this information, the program is allowed to execute 118. If the program does require access to this information, the viewer is prompted 115 for authorization to access the information. If the viewer chooses 116 not to authorize access to the sensitive personal information, the receiving station returns to the wait state 111. The program may alternately be allowed to proceed to access the viewer's user preferences in a limited manner (not shown). If the viewer authorizes 116 access to the information, the program is allowed to access 117 the information. Once the program is allowed access to the information, it is executed 118 according to its program type.

Fig. 7 is a flow diagram illustrating the collection of data at the broadcast station and the building of user profiles and preferences. Steps 120-122 form a loop which is essentially a wait state for the broadcast station. The broadcast station first checks 120 to determine whether it is time to build user preferences. If it is not time, the broadcast station checks 121 to determine whether there is any local data waiting to be received from one of the receiving stations. If local data is waiting, the broadcast station receives 123 the data and updates 124 the cumulative data stored in the broadcast station with the new local data. If local data is waiting, the broadcast station checks 122 to determine whether there is an on-line transaction for which data must be recorded. If there is such data, the cumulative data stored in the broadcast station is updated 124 with the new on-line data. If there is no new on-line data, the broadcast station continues in the wait state.

If it is time to build user preferences, the broadcast station proceeds to step 125. In the illustrated embodiment, the receiving stations are prompted 125 to transmit their local data to the broadcast station. As the receiving stations transmit this data, it is received 126 by the br adcast station, which then updates 127 the cumulative data stored in the broadcast station. After the cumulative data in the broadcast station has been

updated with the local data from each of the receiving stations, the broadcast station builds 128 user profiles based on the cumulative data. The user profiles are then used to build 129 user preferences for each of the receiving stations. These user preferences are transmitted 130 to the receiving stations, which use the preferences to customize the program content of program signals received from the broadcast station.

Numerous variations and modifications will become apparent to those skilled in the art once the above disclosure is fully appreciated. It is intended that the following claims be interpreted to embrace all such variations and modifications.

WHAT IS CLAIMED IS:

1. A method for customizing program content according to viewer preferences in an interactive television system having a broadcast station and a plurality of receiving stations, the method comprising:

tracking viewing information at each of said plurality of receiving stations;

transmitting said viewing information to said broadcast station;

building one or more population profiles based upon said viewing information;

generating a plurality of viewer preference filters, each of said viewer preference filters corresponding to one of said plurality of receiving stations;

transmitting each of said plurality of viewing preference filters to said corresponding one of said plurality of receiving stations;

filtering a program signal received at each of said plurality of receiving stations based on said viewer preference filters to obtain said customized program content.

2. The method of claim 1 wherein said step of filtering comprises

receiving said program signal;

processing said program signal to derive one or more broadcast programs therefrom, each of said one or more broadcast programs having a credential code;

verifying said credential code of each of said one or more broadcast programs;

applying said viewer preference filters to filter said one or more broadcast programs.

3. The method of claim 2 wherein said viewer preferences comprise sensitive personal information and wherein said step of filtering further comprises determining whether said broadcast programs require access to said sensitive personal information prompting a viewer for authorization to access said sensitive personal information for each of said broadcast programs which requires access to said sensitive personal information allowing access to said sensitive personal information by each of said broadcast programs which requires access to said sensitive personal information and which is authorized by said viewer.

4. The method of claim 1 wherein said viewing information comprises local transaction data and wherein said step of tracking comprises detecting one or more local transactions at said receiving stations and recording said local transaction data corresponding to said local transactions in a plurality of data storage units, each said data storage unit corresponding to one of said plurality of receiving stations.

5. The method of claim 4 wherein said viewing information comprises on-line transaction data and wherein said step of tracking further comprises detecting one or more on-line transactions at said broadcast station and recording said on-line transaction data corresponding to said on-line transactions in a data storage unit corresponding to said broadcast station.

6. The method of claim 5 wherein said step of building comprises accumulating said viewing information in a database and generating said viewer preference filters based upon said database.

7. The method of claim 6 wherein said database further comprises personal data and wherein said step of building further comprises obtaining said personal data from a plurality of viewers, each of said viewers being associated with one of said receiving stations.

8. The method of claim 1 wherein said transmitting said viewer preference filters comprises broadcasting a request signal to said receiving stations, said request signal prompting one or more of said receiving stations to initiate communication with said broadcast station via one or more modem connections.

9. The method of claim 1 wherein said transmitting said viewer preference filters comprises said broadcast station initiating communication with said receiving stations via one or more modem connections.

10. The method of claim 1 wherein said transmitting said viewer preference filters comprises broadcasting said viewer preference filters to said receiving stations via a broadcast transmission medium and wherein one of said receiving stations corresponding to each said viewer preference filter identifies said corresponding viewer preference filter and stores said viewer preference filter.

11. The method of claim 1 wherein said filtering comprises executing an application at each of said receiving stations, said application having access to said viewer preference filters, execution of said application being dependent upon said viewer preference filters.

12. A method for profiling user preferences by a network operator, the method being implemented in an interactive television network having a broadcast station and a plurality of receiving stations, the method comprising:

recording on-line data at said broadcast station, said on-line data corresponding to a plurality of on-line transactions;

recording local data at said receiving stations, said local data corresponding to a plurality of local transactions;

transmitting said local data to said broadcast station;

profiling said user preferences at said broadcast station from said on-line data and said local data.

13. The method of claim 12 further comprising transmitting data reflecting said user preferences to said receiving stations.

14. The method of claim 13 further comprising filtering a broadcast signal transmitted from said broadcast station to said receiving stations based on said user preferences.

15. The method of claim 12 wherein said broadcast station and said receiving stations are coupled to a transmission medium and wherein one or more program signals are transmitted from said broadcast station to said receiving stations via said transmission medium.

16. The method of claim 15 wherein said transmissi n medium has a bandwidth, wherein said transmission medium c mprises a return path which occupies a p rtion of said bandwidth and wherein said step of transmitting said local data t said broadcast station comprises transmitting said local data via said return path.

17. The method of claim 12 wherein said broadcast station and said receiving stations are coupled to a first transmission path configured to transmit one or more program signals from said broadcast station to said receiving stations and wherein each of said receiving stations is coupled to one of or more alternate transmission paths configured to transmit said local data from said receiving stations to said broadcast station.

18. A system for customizing program content in an interactive television network comprising:

a broadcast station configured to transmit one or more program signals;

one or more receiving stations coupled to said broadcast station via a transmission medium and configured to receive said one or more program signals;

wherein said system is configured to record transaction data for said one or more receiving stations, to build one or more user profiles based on said transaction data, and to customize said program content of said program signals based on said user profiles.

19. The system of claim 18 wherein said transaction data comprises local transaction data and wherein said one or more receiving stations are configured to record said local transaction data.

20. The system of claim 19 wherein said one or more receiving stations each comprise a random access memory and wherein each of said one or more receiving stations is configured to store said local transaction data in said random access memory and to periodically transmit said local transaction data to said broadcast station.

21. The system of claim 20, further comprising a plurality of modems, one of said modems being coupled to said broadcast station, each of the remainder of said plurality of modems being coupled to a corresponding on of said receiving stations, said modems coupled to said receiving stations being configured to establish telephone communication with said modem coupled to said broadcast station, said receiving stations being configured to transmit said local data to said broadcast station via said corresponding modem.

22. The system of claim 21 wherein said broadcast station is configured to generate one or more user preference filters and transmit said one or more user preference filters to one of said one or more receiving stations via said corresponding modem and wherein said one of said receiving stations customizes said one or more program signals received by said one of said receiving stations according to said one of said user preference filters

23. The system of claim 18 wherein said transaction data comprises on-line transaction data and wherein said broadcast station is configured to record said on-line transaction data.

24. The system of claim 18 wherein said broadcast station is configured to generate one or more user preference filters and transmit said one r more user preference filters to one of said one or more receiving stations and wherein said one of said receiving stations customizes said one or more program signals received by said one of said receiving stations according to said one of said user preference filters.

25. The system of claim 24 wherein said program signal comprises data corresponding to said program content and data corresponding to said user profiles.

26. The system of claim 24,

wherein said system further comprises one or more return paths, each said return path being associated with a corresponding one of said one or more receiving stations, each said return path comprising a receiving station modem coupled to said corresponding receiving station, a telephone line coupled to said receiving station modem and a broadcast station modem coupled to said broadcast station, and

wherein said broadcast station is configured to transmit a prompt signal to said one of said receiving stations via said transmission medium, wherein said one of said receiving stations is configured to establish communications with said broadcast station via said corresponding return path in response to said prompt signal, and wherein said broadcast station is configured to transmit said one or more user profiles to said one of said receiving stations via said return path.

27. The system of claim 18 wherein said broadcast station is configured to customize said one or more program signals according to said one or more user profiles prior to transmitting said one or more program signals to said one or more receiving stations.

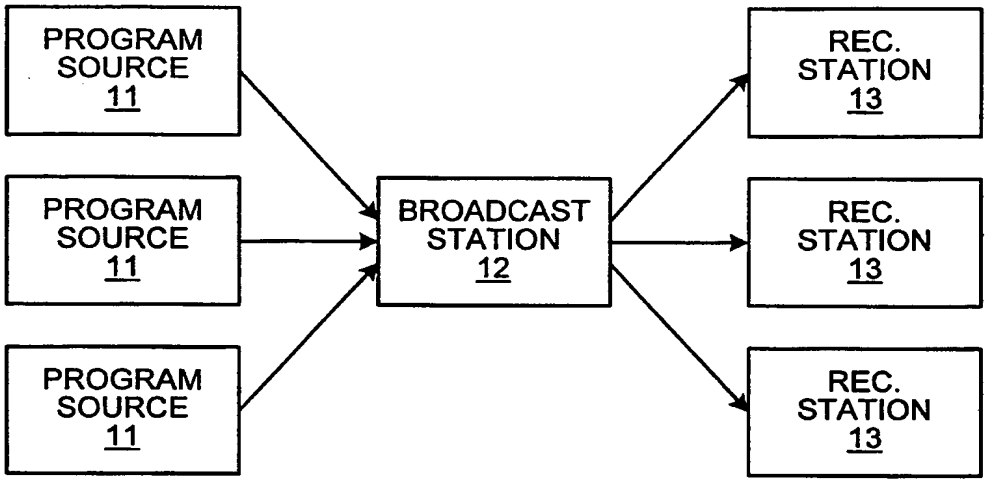
PROGRAM SOURCE 11
PROGRAM SOURCE 11
PROGRAM SOURCE 11
BROADCAST STATION 12
REC. STATION 13
REC. STATION 13
REC. STATION 13

FIG. 1

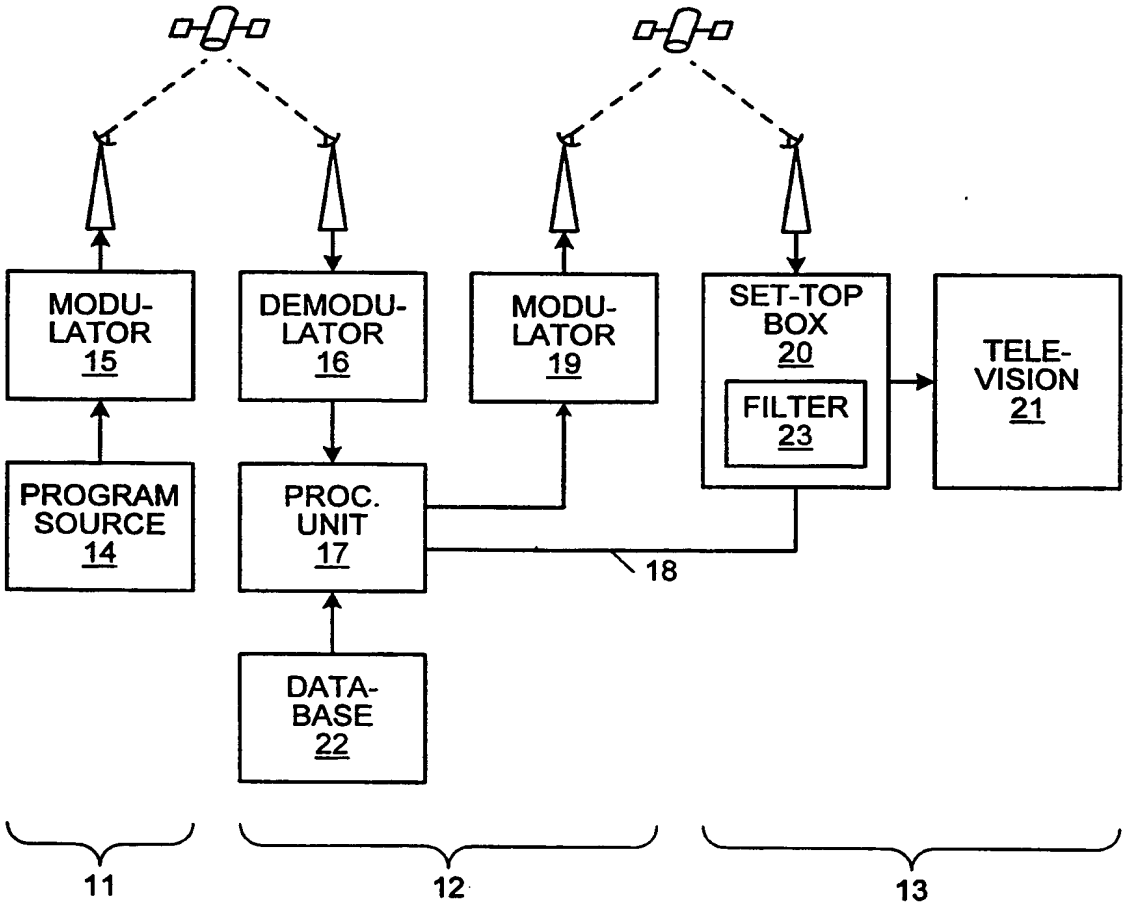
MODU-LATOR 15
DEMODU-LATOR 16
MODU-LATOR 19
SET-TOP BOX 20
FILTER 23
TELE-VISION 21
PROGRAM SOURCE 14
PROC. UNIT 17
18
DATA-BASE 22
11
12
13

FIG. 3

VIDEO 1 41
AUDIO 1 42
VIDEO 1 43
INTER-ACTIVE 44
VIDEO 2 45
AUDIO 2 46
VIDEO 2 47

FIG. 2

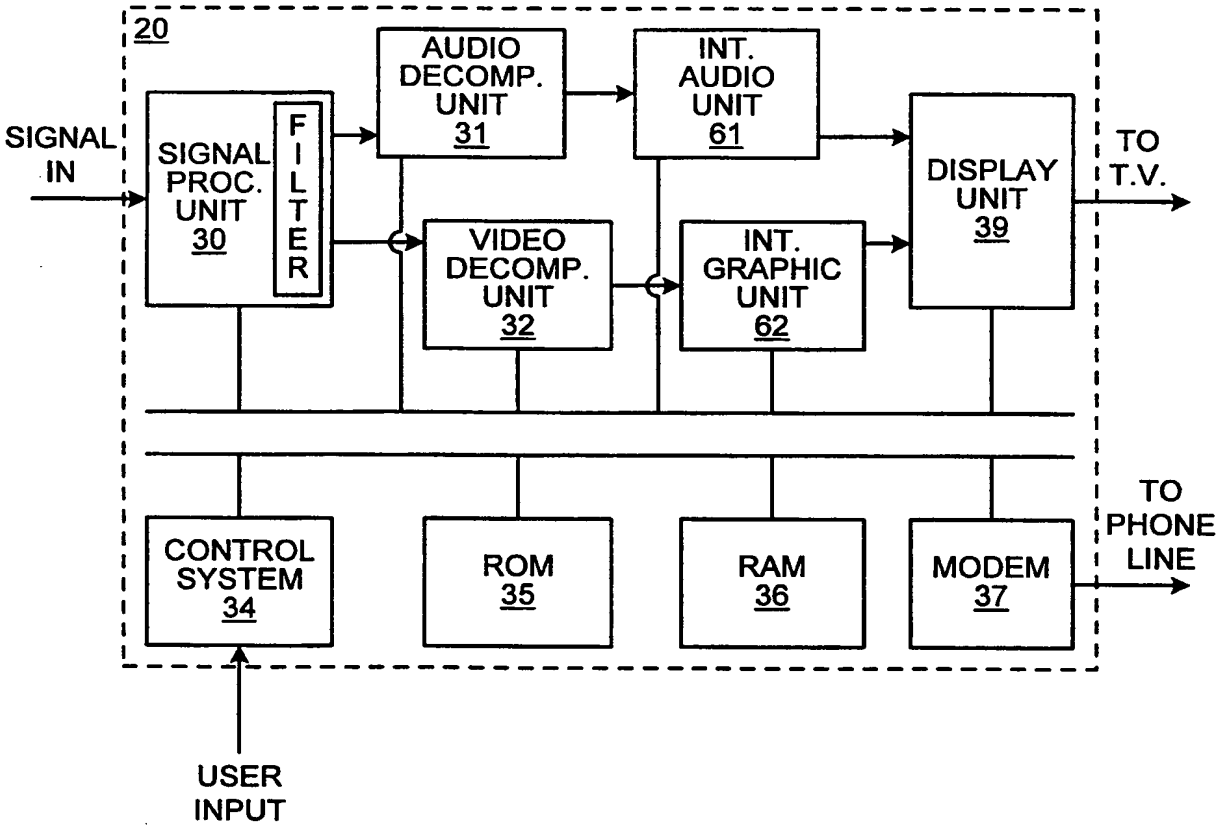
20
SIGNAL IN
SIGNAL PROC. UNIT 30
FILTER
AUDIO DECOMP. UNIT 31
INT. AUDIO UNIT 61
VIDEO DECOMP. UNIT 32
INT. GRAPHIC UNIT 62
DISPLAY UNIT 39
TO T.V.
CONTROL SYSTEM 34
ROM 35
RAM 36
MODEM 37
TO PHONE LINE
USER INPUT

FIG. 4

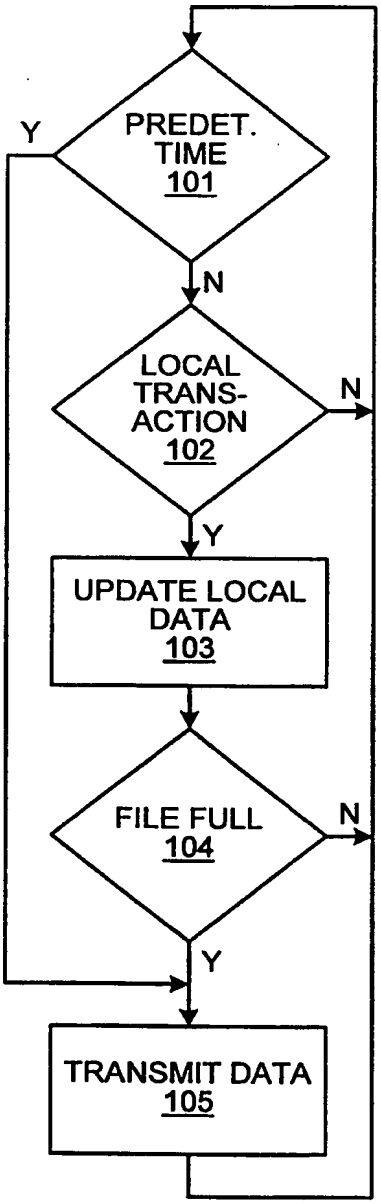
PREDET. TIME 101
Y
N
LOCAL TRANS-ACTION 102
N
Y
UPDATE LOCAL DATA 103
FILE FULL 104
N
Y
TRANSMIT DATA 105

FIG. 5

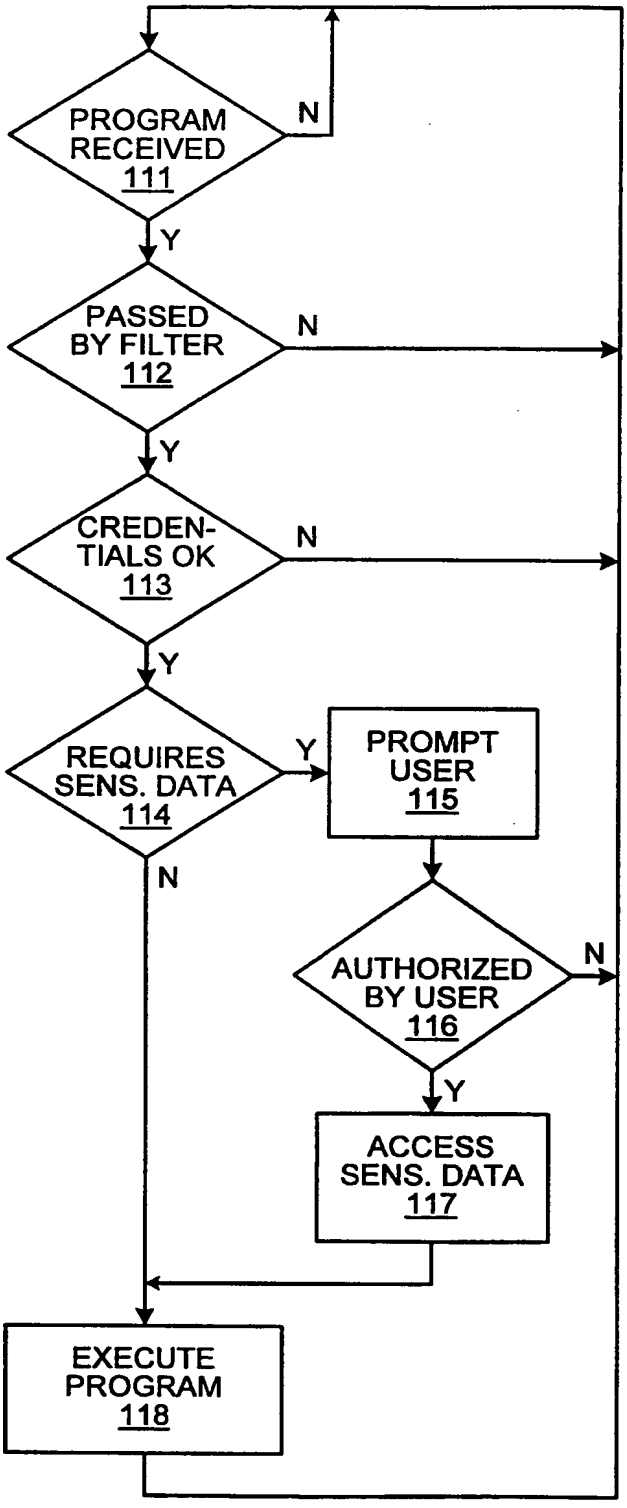
PROGRAM RECEIVED 111
N
Y
PASSED BY FILTER 112
N
Y
CREDEN-TIALS OK 113
N
Y
REQUIRES SENS. DATA 114
Y
PROMPT USER 115
N
AUTHORIZED BY USER 116
N
Y
ACCESS SENS. DATA 117
EXECUTE PROGRAM 118

FIG. 6

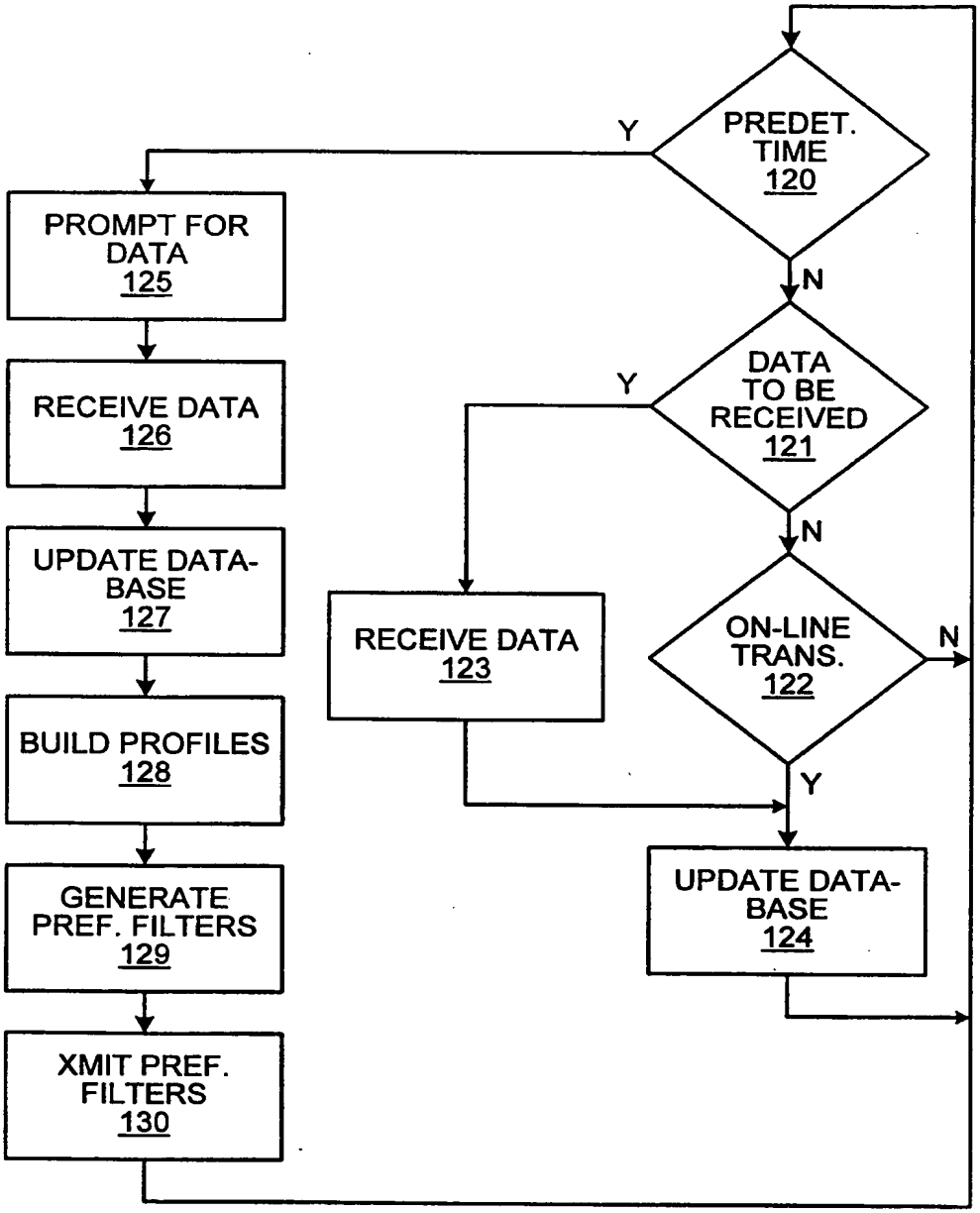
PREDET. TIME 120
Y
N
PROMPT FOR DATA 125
RECEIVE DATA 126
UPDATE DATA-BASE 127
BUILD PROFILES 128
GENERATE PREF. FILTERS 129
XMIT PREF. FILTERS 130
DATA TO BE RECEIVED 121
Y
N
RECEIVE DATA 123
ON-LINE TRANS. 122
N
Y
UPDATE DATA-BASE 124

FIG. 7

INTERNATIONAL SEARCH REPORT

Inte. ional Application No
PCT/US 99/10070

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N7/173 H04N7/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y,P	WO 98 37696 A (HERZ FREDERICK S M) 27 August 1998 (1998-08-27)	1,12,18
A	the whole document	2-11, 13-17, 19-27

Y	EP 0 424 648 A (GEN INSTRUMENT CORP) 2 May 1991 (1991-05-02)	1,12,18
A	the whole document	2-11, 13-17, 19-27

A	WO 96 08109 A (CARLES JOHN B) 14 March 1996 (1996-03-14) the whole document	1-27

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
4 August 1999	10/08/1999

Name and mailing address of the ISA	Authorized officer
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1

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INTERNATIONAL SEARCH REPORT

Inte .ional Application No
PCT/US 99/10070

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 95 15658 A (DISCOVERY COMMUNICAT INC) 8 June 1995 (1995-06-08) the whole document	1-27
A	EP 0 784 405 A (SONY CORP) 16 July 1997 (1997-07-16) the whole document	1-27
A	WO 89 09528 A (SCIENTIFIC ATLANTA) 5 October 1989 (1989-10-05) abstract	1-27

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